

Claims

We claim:

1. A method for modeling a graphics object, comprising:
 - providing a model of the graphics object;
 - generating a first adaptively sampled distance field for the model;
 - constructing a topological hint;
 - generating a second adaptively sampled distance field for the topological hint;
 - sampling first locations of the second adaptively sampled distance field to determine a corresponding topological feature for each location;
 - determining second locations in the first adaptively sampled distance field from the corresponding topological features of the second adaptively sampled distance field; and
 - sampling the first adaptively sampled distance field at the second locations to determine a distance value for each of the second locations to model the graphics object according to the topological hint.
2. The method of claim 1 wherein the topological features are distance values of the second adaptively sampled distance field, further comprising:
 - generating a third adaptively sampled distance field from the distance values at each second location.
3. The method of claim 2 further comprising:
 - rendering the third adaptively sampled distance field.

4. The method of claim 1 wherein the topological hint is constructed from graphics primitives.
5. The method of claim 4 wherein the graphical primitive has a corresponding implicit function, and the second adaptively sample distance field is generated from the implicit function.
6. The method of claim 1 wherein the topological hint is constructed from a plurality of graphical primitives, and further comprising:
 - generating a primitive adaptively sampled distance field for each graphics primitive;
 - combining the plurality of primitive adaptively sampled distance fields to generate the second adaptively sampled distance field.
7. The method of claim 6 wherein the combining includes CSG operations.
8. The method of claim 1 wherein the topological features are distance values of the second adaptively sampled distance field, and the distance values of the first and second adaptively sampled distance fields are combined.
9. The method of claims 1, 2, 5, and 6 wherein the generating comprises defining a candidate cell of the adaptively sampled distance field, determining and storing distance values of the candidate cell in a bounded distance tree, recursively subdividing the candidate cell into subdivided cells of the adaptively sampled distance field while determining and storing corresponding distance values of the subdivided cells in the bounded distance tree until a termination condition is

reached, and appending the distance values to the corresponding cells to generate the adaptively sampled distance field of the object.